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Research Article

TOURISTS' PERCEPTIONS OF SMART TOURISM SERVICES IN A CHINESE THEME PARK: AN IPA-BASED STUDY OF NINGBO FANGTE ORIENTAL DAWN

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Abstract

Smart tourism has become an important means of enhancing the competitiveness and service quality of theme parks. However, limited research has explored how visitors perceive the importance and performance of specific smart service components in Chinese theme parks. This study assesses tourists' perceptions of smart tourism services at Ningbo Fangte Oriental Dawn using a case study approach, a questionnaire survey, and the Importance-Performance Analysis (IPA) framework. A total of 387 valid responses from actual park visitors were analyzed. The results indicate that contactless payments, electronic map updates, ticketing convenience, social media publicity, and intelligent parking were perceived as both important and satisfactory. In contrast, mobile tourism services, online ticket discounts, and visitor-flow diversion were placed in the "Concentrate Here" quadrant, highlighting areas that require managerial attention. The findings provide clear decision-making references for theme park managers to optimize operations and allocate resources effectively, offering valuable practical implications for aligning smart tourism service investments with tourists' perceived value.

Keywords: theme park, smart tourism, tourist satisfaction, importance-performance analysis

JEL Classification: Z30; L83; M31; C83

1. Introduction

Although existing studies recognize the value of smart services (Chuang, 2023), marketing (Novera et al., 2022), management (Muniz et al., 2021), and transportation (Lin et al., 2022), most remain at the level of technical function description or isolated dimensional analysis. Few studies start from tourists' perceptions and compare the importance and satisfaction of specific smart service elements in a theme park setting.

The strategic implementation of smart technologies can address tourists' evolving expectations for convenience and establish a differentiated advantage in a dynamic market (Neuhofer et al., 2015). Specific applications of smart tourism in theme parks include electronic ticketing and contactless entry systems, intelligent parking management (Wang et al., 2016), smart retail solutions, and interactive wayfinding and navigation tools (Zhang et al., 2022). These technologies not only enhance operational efficiency but also empower tourists with greater control over their park experience, leading to improved satisfaction and a stronger sense of engagement (Xiang & Fesenmaier, 2017). However, the introduction of technology does not always translate into high-quality tourist experiences. Without user-centered design and precise resource allocation, some smart functions may suffer from low usage rates, insufficient perceived value, or even the risk of disrupting the visitor experience (Reveles-Gómez et al., 2021). Therefore, it is important to identify which smart tourism elements are considered important by tourists.

Current the current literature on the development of smart tourism in China tends to focus on macro policy evolution, technological infrastructure, and application cases (Li et al., 2017; Wang et al., 2022). International studies, in turn, examine smart tourism through the lenses of service ecosystems, visitor

co-creation, information accessibility, content richness, interactivity, and personalization (Gretzel et al., 2015b; Tsang & Au, 2024).

This study aims to identify the relative importance and perceived performance of smart tourism service components at Ningbo Fangte Oriental Dawn. Rather than testing causal effects, mediation, or moderation, the study uses IPA to classify managerial priorities across 26 visitor-evaluated indicators in four dimensions: smart services, smart marketing, smart management, and smart transportation. The study is guided by three research questions: RQ1: Which smart tourism service elements do visitors perceive as most important? RQ2: Which elements generate higher or lower satisfaction? RQ3: Which elements should be prioritized, maintained, reconsidered, or treated as lower priority according to the IPA matrix? The remainder of the paper is organized as follows. Section 2 reviews smart tourism and theme park studies; Section 3 explains the case selection, sampling procedure, questionnaire design, ethical considerations, and IPA method; Section 4 reports the statistical and IPA results; Section 5 discusses the Ningbo Fangte Oriental Dawn case; and Section 6 presents conclusions, practical implications, and limitations.

2. Literature review

2.1 Development of smart tourism in China

In smart tourism, modern information technologies are used to enable tourists to proactively access information and resources with the use of internet-connected devices, thereby personalizing the travel experience and increasing satisfaction (Zuo & Tang, 2020). The international concept of "Smart Tourism" can be traced back to the early 2000s (Li et al., 2017). In 2008, IBM's "Smarter Planet" initiative emphasized "Smart Cities" as a core driver, promoting the intelligent application of information technology in urban management and services (Ching & Ferreira, 2015); smart tourism has since become a crucial element of this initiative.

In China, smart tourism has therefore received considerable policy attention and has been treated as an important tool for promoting high-quality tourism development. These policies provide institutional support and strategic guidance for smart tourism (State Council of the People's Republic of China, 2022; Ministry of Culture and Tourism et al., 2024). Problems such as insufficient data sharing, lagging standard system construction, uneven platform interoperability, and talent shortages (Su, 2024; Xu et al., 2023) restrict the further development of smart tourism.

In summary, existing research on smart tourism in China has mainly focused on macro-level policy evolution, technological infrastructure, application cases, and implementation barriers (Li et al., 2017; Wang et al., 2022; Su, 2024; Xu et al., 2023). International studies further conceptualize smart tourism through service ecosystems, visitor co-creation, information accessibility, interactivity, and personalization (Gretzel et al., 2015b; Tsang & Au, 2024). Together, these studies provide the conceptual foundation for selecting indicators and applying the IPA method in this research. This is echoed by a comprehensive review of the smart tourism literature (Mehraliyev et al., 2020), which identifies 11 thematic areas and notes that while consumer-related topics (e.g., effects on tourists, adoption of technologies) are well represented, context-specific evaluations in settings such as theme parks remain limited. The same review highlights several international contributions that help situate the present study: Gretzel et al. (2015a) conceptualize smart tourism as comprising smart destinations, business ecosystems, and experiences; Buhalis and Amaranggana (2015) introduce the smart tourism destination (STD) framework centered on real-time personalization and interconnectivity; and Wang et al. (2016) demonstrate the applicability of Importance-Performance Analysis (IPA) to evaluate smart tourism attractions, thereby providing a direct methodological precedent for the current IPA-based investigation.

2.2 Theme park smart tourism

Research on smart tourism in theme parks addresses various aspects, including the interrelationships among smart services, marketing, and management (Padmalata et al., 2025; Tsang & Au, 2024). This research emphasizes functional integration, specifically the coordination of service interfaces, marketing channels, operational data, and visitor-facing technologies to enhance visitor experience and operational efficiency.

Additionally, studies on smart tourism ecosystems highlight multi-stakeholder collaboration among governments, operators, tourists, residents, and technology providers (Gretzel et al., 2015a). This perspective underscores data-sharing platforms, policy support, and corporate responsibility as factors that influence the implementation of smart tourism services.

Although these studies have deepened the understanding of smart tourism in theme parks, many focus on a single perspective, such as technology deployment, visitor experience, or operational management. For theme parks, however, smart tourism is realized through a set of concrete service encounters: entry, navigation, payment, entertainment, marketing communication, complaint handling, parking, and visitor-flow control. An IPA approach is therefore useful for comparing which components visitors value and how well those components perform, though it remains limited to managerial prioritization rather than causal explanation.

3. Methodology

3.1 Evaluation indicator selection

Based on a systematic review of existing literature, this study identifies smart service, smart marketing, smart management, and smart transportation as four critical and interrelated dimensions in smart theme park development (see Table 1). The indicators were selected to represent visitor-facing service encounters rather than a comprehensive causal model of satisfaction.

Table 1. Evaluation indicators

Aspects		Indicators	References
Smart Service	A1	Accuracy of answering questions by intelligent customer service	Jung et al., 2015
	A2	Functionality of self-guided tour equipment in the scenic area	Zhang et al., 2022
	A3	Immersive quality of virtual reality (VR) / augmented reality (AR) experiences	Nakai, 2020
	A4	Professionalism of intelligent guided tours and explanations	Oh & Ma, 2018
	A5	Richness of query service functions in the scenic area	Wang et al., 2016
	A6	Smooth operation of mobile tourism services (Apps, mini programs)	Zhang et al., 2022
	A7	Smoothness and convenience of using intelligent payment	Pai et al., 2020
	A8	Strong mobile signal and stable connection within the scenic area	Wang et al., 2016
	A9	The captivating nature of special effects performances using intelligent systems	Azmin et al., 2023
	A10	Timeliness of information release by the scenic area tourism information system	Tian et al., 2024
	A11	Timeliness of updates for the electronic map query function	Zhang et al., 2022
Smart Marke-ting	B1	Convenience of ticket modification and refund in the ticketing system	Yu et al., 2018
	B2	Convenient and quick purchase of tourism products within the scenic area	Yu et al., 2018
	B3	Engaging nature of entertainment activities within the scenic area	Yu et al., 2018
	B4	Intelligent personalized recommendation system	Liu & Liu, 2024
	B5	Membership system	Yu et al., 2018
	B6	Online ticketing discount activities	Wong & Cheung, 1999
	B7	Prices of combined tickets or package products with nearby hotels and restaurants	Mohamad Sheriff et al., 2024
	B8	Scenic area publicity content on social media platforms	Natasha et al., 2023
Smart Mana-gement	C1	Ability to protect equipment	Zhao & Zhan, 2019
	C2	Efficient speed of accepting tourist complaints	Wang, 2019
	C3	Implementing smart systems for waste collection, sorting, and recycling	Farid et al., 2023

Aspects		Indicators	References
	C4	Maintaining cybersecurity to protect visitor data	Zhao et al., 2021
	C5	Smart emergency response system	Wang, 2019
	C6	The functions of the scenic area meteorological monitoring system	Chen, 2022
Smart Trans-portation	D1	Availability of electric vehicle charging stations	Ejaz et al., 2020
	D2	Effective visitor flow control through tourist diversion	Wang et al., 2016
	D3	Partnering with public transportation service providers	Florido-Benítez, 2024
	D4	The convenience of using the intelligent parking system	Wang et al., 2016
	D5	The intelligent parking area is equipped with facilities such as lighting and surveillance	Tokody et al., 2018

Note: Indicators C3, C4, D1, and D3 were not included in the final questionnaire due to length and respondent burden. The empirical analysis is based on the remaining 26 indicators.
Source: Author's creation

Ningbo Fangte Oriental Dawn was chosen because it is a large cultural theme park with high visitor volume, digital ticketing, mobile service channels, electronic map functions, smart payment, parking support, and operational information systems. This case is suitable for an exploratory single-case study because it allows detailed examination of how smart tourism components are perceived within a real park setting. Following case study logic, the aim is to gain analytical insight into a context-rich environment rather than to achieve statistical generalization to all theme parks.

The first dimension is smart service, aims to enhance the visitor experience. Key elements include the accuracy of answers provided by intelligent customer service systems (Jung et al., 2015), the functionality of self-guided tour equipment (Zhang et al., 2022), and the immersive quality of virtual and augmented reality (VR/AR) experiences (Nakai, 2020). Other aspects of smart service include the professionalism of intelligent guided tours (Oh & Ma, 2018), the richness of available query functions (Wang et al., 2016), smooth mobile services (Zhang et al., 2022) and using intelligent payment technologies (Pai et al., 2020). Additional benefits stem from having a strong mobile network (Wang et al., 2016), captivating special effects (Azmin et al., 2023), information timeliness (David et al., 2024), and updated electronic maps (Zhang et al., 2022).

The second aspect is smart marketing, which improves consumer traffic through a combination of social media techniques (Natasha et al., 2023), customer profile customization (Liu & Liu, 2024), offers and ticket discounts (Wong & Cheung, 1999), and membership system implementations (Yu et al., 2018), as well as using all of the above for combined tickets (Mohamad Sheriff et al., 2024). Additionally, a convenient ticket system and engaging entertainment options improve satisfaction (Yu et al., 2018).

The third dimension is smart management, supports safety and operational continuity through emergency response systems, equipment protection, complaint handling, waste-management support, cybersecurity protection, and meteorological monitoring (Chen, 2022; Farid et al., 2023; Wang, 2019; Zhao et al., 2021; Zhao & Zhan, 2019).

The fourth dimension is smart transportation, which focuses on accessibility and visitor flow. This is enabled through convenient intelligent parking systems (Wang et al., 2016), effective visitor flow control (Wang et al., 2016), parking areas with lighting and surveillance (Tokody et al., 2018), transportation partnerships (Florido-Benítez, 2024), and availability of electric vehicle charging (Ejaz et al., 2020).

3.2 The importance-performance analysis

The aim of this study is to evaluate visitors' perceived importance and satisfaction with smart tourism services at Ningbo Fangte Oriental Dawn. A quantitative case study approach was used, employing using structured questionnaire surveys and IPA for data interpretation. The questionnaire comprised two sections. The first section collected demographic data—including gender, age, occupation, educational background, monthly income, residence, and visit frequency, primarily through single-choice questions (occupation was the only exception, using an open-ended format). The second section evaluated perceptions of smart tourism services across four dimensions: smart service, smart marketing, smart management, and smart transportation. A total of 30 indicators were identified from the literature. However, due to concerns about questionnaire length and respondent burden, and because these four

indicators—C3 (waste collection/sorting/recycling), C4 (cybersecurity), D1 (electric vehicle charging stations), and D3 (public transport partnership)—primarily reflect back-end operational or infrastructure-level services that are less directly observable or evaluable by park visitors during a single visit, they were excluded, resulting in a final survey of 26 indicators. Participants rated each indicator's importance and satisfaction on a five-point Likert scale: importance ranged from 1 (very unimportant) to 5 (very important), and satisfaction ranged from 1 (completely dissatisfied) to 5 (completely satisfied).

The study employed a convenience sampling method. On-site questionnaire surveys were conducted at Ningbo Fangte Oriental Dawn from 5 February to 20 February 2025 at several main entrances, exit routes, and visitor rest areas. Eligible respondents were actual park visitors who had already experienced at least part of the park visit on the survey day. To reduce repeated participation, each respondent was asked whether they had already completed the questionnaire, and duplicate or incomplete responses were excluded during data cleaning. For respondents under 18, questionnaires were completed only when a parent or guardian was present and consented. Participation was voluntary and anonymous, and respondents were informed that the data would be used only for academic research. Finally, 400 questionnaires were distributed, and 387 valid questionnaires were retained, yielding an effective response rate of 96.75%.

The survey period coincided with a high-demand winter holiday and post-Spring Festival travel period in China. This timing may have influenced visitor composition, crowd levels, spending behavior, and satisfaction evaluations. Local families, students, and repeat visitors may have been more visible in the sample. Therefore, the findings should be interpreted as reflecting the selected period and case context rather than the full-year visitor population.

Mean importance and satisfaction scores for each indicator were calculated to facilitate IPA. Following Martilla and James (1977), each item was plotted on a two-dimensional matrix, with importance on the horizontal axis and satisfaction on the vertical axis. The crosshair thresholds were the overall mean importance score (3.34) and the overall mean satisfaction score (4.12). Items above both means were assigned to 'Keep Up the Good Work'; items with above-mean importance and below-mean satisfaction were assigned to 'Concentrate Here'; items with below-mean importance and above-mean satisfaction were assigned to 'Possible Overkill'; and items below both means were assigned to 'Low Priority'. This approach supports managerial prioritization but does not estimate statistical significance, direct effects, mediation, or moderation.

4. Results

4.1 Descriptive statistics

The demographic profile of the sample is presented in Table 2. Female visitors accounted for 54.26%, while male visitors comprised 45.74%, indicating a relatively balanced gender distribution. Participants under 18 and those aged 18–25 together made up 38.5% of the respondents. Enterprise employees accounted for 52.2%, while students made up 25.06%. The overall level of education was relatively high, with the majority holding a bachelor's degree or higher. 25.06% of visitors reported a monthly income below 2,500 RMB, while 20.16% earned between 2,500 and 4,999 RMB. More than 45% of the total respondents had a monthly income of less than 5,000 RMB. Most of the visitors were from Ningbo city itself, at 69.51%. As for visits, the majority respondents were repeat visitors to the park. The highest percentage of 31.52% of the visitors reported they came to the park for the second time.

Table 2. Descriptive statistical analysis

Project	Category	Count	Percentage
Gender	Male	177	45.74%
	Female	210	54.26%
Age	Under 18	16	4.13%
	18-25	133	34.37%
	26-44	69	17.83%
	45-59	100	25.84%
	60 and above	69	17.83%

Project	Category	Count	Percentage
Occupation	Civil Servant	40	10.34%
	Enterprise Employee	202	52.20%
	Individual/Private Business	28	7.24%
	Student	97	25.06%
	Farmer	20	5.17%
Education Level	Junior High School and Below	34	8.79%
	High School/Vocational School	72	18.60%
	College	68	17.57%
	Bachelor's Degree	174	44.96%
	Master's Degree and Above	39	10.08%
Monthly Income	Under 2500RMB	97	25.06%
	2500-4999RMB	78	20.16%
	5000-7499RMB	76	19.64%
	7500-9999RMB	77	19.90%
	10000RMB and above	59	15.25%
Residence	Within Ningbo	269	69.51%
	Other Cities in Zhejiang	100	25.84%
	Other Provinces in China	18	4.65%
Travel Frequency	First Time	97	25.06%
	Second Time	122	31.52%
	Third Time	94	24.29%
	More than Three Times	74	19.12%

Source: Author's creation

4.2 Reliability and validity

Data were analyzed using SPSS 27.0 for descriptive statistics, reliability analysis, and exploratory factor analysis; Excel was used to construct the IPA matrix. To ensure the measurement instrument's reliability, Cronbach's alpha and composite reliability (CR) were calculated (see Table 3). Cronbach's alpha values above 0.70 and CR values above 0.70 were considered acceptable for exploratory research (Nunnally, 1978; Bagozzi & Yi, 1988). The results showed that all retained latent variables in both dimensions (importance and satisfaction) exceeded these thresholds. As noted in Section 3.2, the analyses were performed on the 26 surveyed indicators; no data were collected for C3, C4, D1, and D3. Table 3 presents the factor loadings, Cronbach's α, CR, and AVE for the retained items; all values met the recommended thresholds (Nunnally, 1978; Fornell & Larcker, 1981).

Table 3. Results of factor analysis

	Item	Factor Loading	Cronbach's α	CR	AVE (Average Variance Extracted)
Importance					
Smart Marketing	IB7	0.707	0.906	0.920	0.591
	IB3	0.751			
	IB2	0.774			
	IB6	0.776			
	IB1	0.778			
	IB8	0.782			
	IB4	0.782			
	IB5	0.798			
Smart Service	IA1	0.746	0.933	0.939	0.584
	IA6	0.752			
	IA8	0.757			
	IA11	0.757			
	IA5	0.763			
	IA4	0.767			
	IA2	0.770			
	IA9	0.770			
	IA7	0.770			
	IA3	0.773			

	Item	Factor Loading	Cronbach's α	CR	AVE (Average Variance Extracted)
Importance					
Smart Management	IA10	0.787	0.826	0.877	0.641
	IC5	0.783			
	IC1	0.791			
	IC2	0.811			
	IC6	0.818			
Smart Transportation	ID4	0.809	0.781	0.861	0.675
	ID2	0.825			
	ID5	0.828			
Satisfaction					
Smart Marketing	SB7	0.750	0.911	0.927	0.612
	SB2	0.750			
	SB3	0.759			
	SB1	0.775			
	SB4	0.801			
	SB5	0.802			
	SB8	0.806			
	SB6	0.816			
Smart Service	SA1	0.763	0.938	0.945	0.607
	SA8	0.768			
	SA5	0.768			
	SA2	0.770			
	SA3	0.771			
	SA11	0.777			
	SA6	0.782			
	SA9	0.786			
	SA7	0.789			
	SA4	0.792			
	SA10	0.806			
Smart Management	SC1	0.796	0.841	0.884	0.656
	SC2	0.809			
	SC6	0.812			
	SC5	0.822			
Smart Transportation	SD2	0.806	0.789	0.860	0.672
	SD5	0.820			
	SD4	0.833			

Source: Author's creation

For convergent validity (see Table 4), all retained latent variables demonstrated average variance extracted (AVE) values greater than the recommended threshold of 0.50 (Fornell & Larcker, 1981), indicating that the retained items adequately reflect the underlying constructs. For discriminant validity, the square root of the AVE for each construct was compared with inter-construct correlations. The square roots of AVE were higher than the corresponding inter-construct correlations, supporting discriminant validity. In addition, following Henseler et al. (2015), a threshold of 0.90 for inter-construct correlations was adopted, as the constructs in this study are conceptually related but distinct. None of the correlations exceeded this threshold, supporting discriminant validity.

Table 4. Fornell-Larcker criterion and discriminant validity matrix

	Smart Marketing	Smart Services	Smart Management	Smart Transportation
Importance				
Smart Marketing	0.769			
Smart services	0.228	0.764		
Smart Management	0.199	0.162	0.800	
Smart Transportation	0.133	0.230	0.089	0.821

	Smart Marketing	Smart Services	Smart Management	Smart Transportation
Satisfaction				
Smart Marketing	0.782			
Smart services	0.123	0.779		
Smart Management	0.152	0.188	0.810	
Smart Transportation	0.080	0.243	0.252	0.820

Note: The diagonal values represent the square roots of the AVE values.
Source: Author's creation

4.3 IPA results

This study analyzes tourists' perceived importance and satisfaction levels across smart tourism service dimensions by calculating mean scores for each retained indicator (see Table 5). The results are descriptive and should not be regarded as results of statistical significance tests.

Table 5. Importance-Satisfaction data statistics

Importance	Item	Mean value	Satisfaction	Item	Mean value
Smart Management	IC6	3.315	Smart services	SA8	4.070
	IC2	3.320		SA10	4.093
	IC5	3.331		SA5	4.093
	IC1	3.344		SA6	4.098
	Mean value	3.328		SA2	4.098
Smart Marketing	IB2	3.289		SA1	4.111
	IB5	3.310		SA3	4.114
	IB3	3.326		SA4	4.142
	IB4	3.333		SA11	4.147
	IB8	3.344		SA9	4.150
	IB7	3.346		SA7	4.155
	IB6	3.349		Mean value	4.116
	IB1	3.375	Smart Marketing	SB6	4.057
	Mean value	3.334		SB3	4.083
Smart services	IA1	3.282		SB2	4.106
	IA5	3.305		SB5	4.124
	IA4	3.315		SB4	4.132
	IA8	3.326		SB8	4.137
	IA10	3.328		SB1	4.147
	IA3	3.331		SB7	4.150
	IA2	3.333		Mean value	4.117
	IA11	3.344	Smart Transportation	SD5	4.090
	IA9	3.370		SD2	4.109
	IA6	3.372		SD4	4.158
	IA7	3.375		Mean value	4.119
	Mean value	3.335	Smart Management	SC5	4.111
Smart Transportation	ID5	3.297		SC1	4.119
	ID2	3.377		SC2	4.124
	ID4	3.403		SC6	4.202
	Mean value	3.359		Mean value	4.139

Source: Author's creation

In terms of importance, the overall mean values range from approximately 3.33 to 3.36, indicating that tourists attached moderate importance to smart management, marketing, services, and transportation. Within the retained indicators, D4 (convenience of the intelligent parking system), D2 (visitor-flow diversion), A7 (intelligent payment), A6 (mobile tourism services), and B1 (ticket modification and refund) received relatively high importance scores, suggesting that visitors prioritized basic convenience, mobility, and transaction-related services.

In terms of satisfaction, all mean scores exceed 4.0, significantly surpassing the importance scores, which suggests tourists generally have positive experiences. SC6 (mean = 4.202) and SD4 (mean = 4.158) received the highest satisfaction ratings. The overall mean satisfaction score exceeds 4.11, demonstrating a high level of visitor satisfaction.

These data provide a foundation for subsequent IPA, highlighting key service aspects that require further attention and improvement to optimize smart tourism services. The horizontal and vertical axes represent the overall mean values of importance (3.34) and satisfaction (4.12), respectively. To improve readability, the axis labels and threshold values were rounded to two decimal places in figure 1.

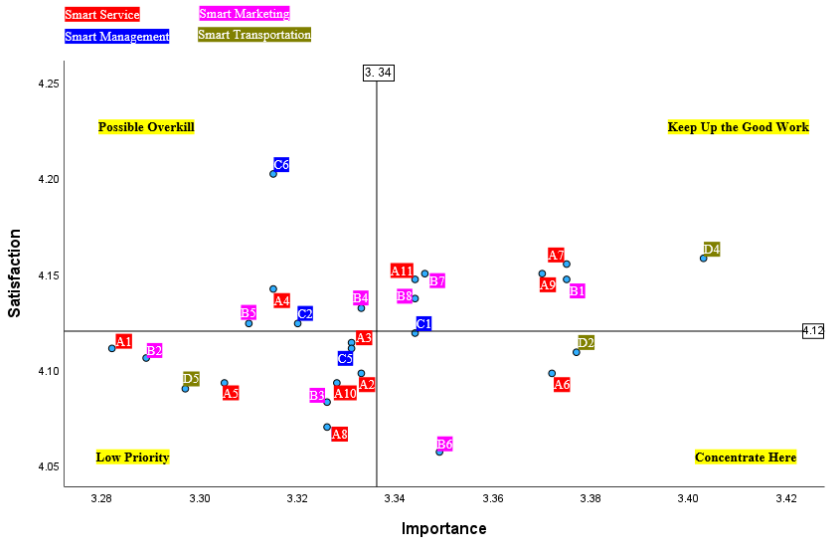

Figure 1. Importance-Satisfaction IPA Diagram

Note: The IPA matrix was constructed using Excel and further edited in PowerPoint for visual presentation in the manuscript

Source: Author's creation

The park should strategically prioritize improvements for indicators located within the "Concentrate Here" zone to enhance visitor satisfaction effectively. At the same time, maintaining and continuously optimizing the high performing "Keep Up the Good Work" indicators is essential for sustaining core strengths. Resources allocated to the "Possible Overkill" and "Low Priority" zones should be re-evaluated to prevent resource wastage and improve operational efficiency. Table 6 shows the IPA results. This data-driven approach facilitates informed decision-making, ultimately aimed at elevating the visitor experience and promoting the sustainable development of the park's smart tourism initiatives.

Table 6. IPA analysis results

Results	
"Keep Up the Good Work" (high importance, high satisfaction)	
A7	Smoothness and convenience of using intelligent payment
A9	The captivating nature of special effects performances using intelligent systems
A11	Timeliness of updates for the electronic map query function
B1	Convenience of ticket modification and refund in the ticketing system
B7	Prices of combined tickets or package products with nearby hotels and restaurants
B8	Scenic area publicity content on social media platforms
C1	Ability to protect equipment
D4	The convenience of using the intelligent parking system
"Concentrate Here" (high importance, low satisfaction)	
A6	Smooth operation of mobile tourism services (Apps, mini programs)
B6	Online ticketing discount activities
D2	Effective visitor flow control through tourist diversion
"Possible Overkill" (low importance, high satisfaction)	
A4	Professionalism of intelligent guided tours and explanations
B4	Intelligent personalized recommendation system

Results	
B5	Membership system
C2	Efficient speed of accepting tourist complaints
C6	The functions of the scenic area meteorological monitoring system
"Low Priority" (low importance, low satisfaction)	
A1	Accuracy of answering questions by intelligent customer service
A2	Functionality of self-guided tour equipment in the scenic area
A3	Immersive quality of virtual reality (VR) / augmented reality (AR) experiences
A5	Richness of query service functions in the scenic area
A8	Strong mobile signal and stable connection within the scenic area
A10	Timeliness of information release by the scenic area tourism information system
B2	Convenient and quick purchase of tourism products within the scenic area
B3	Engaging nature of entertainment activities within the scenic area
C5	Smart emergency response system
D5	The intelligent parking area is equipped with facilities such as lighting and surveillance

Source: Author's creation

5. Discussion

This research offers a perception-based assessment of smart tourism service elements at Ningbo Fangte Oriental Dawn. By combining a single-case design with IPA, the study identifies perceived strengths, weaknesses, and resource-allocation priorities within the park's smart tourism offerings. The results do not establish a causal mechanism, but they clarify how visitors evaluate different service components.

The case context is important for interpreting these results. Ningbo Fangte Oriental Dawn combines cultural performances, themed attractions, digital ticketing, mobile service access, electronic map functions, intelligent payment, parking services, and crowd-management information. For visitors, these technologies are not experienced as abstract infrastructure. They are encountered while buying tickets, entering the park, checking routes, locating attractions, paying for products, responding to queues, and leaving the parking area. This helps explain why transaction convenience, map updates, and parking performed well, whereas mobile-service smoothness and visitor-flow diversion still appeared as improvement priorities.

First, the smooth operation of mobile tourism services (A6) was classified in the 'Concentrate Here' quadrant. This aligns with studies emphasizing that mobile service smoothness is foundational to smart tourism experiences (Li et al., 2017; Zhang et al., 2022). In a high-density theme park, mobile services are used under time pressure and in location-specific situations. Small delays, unclear interfaces, or unstable functions may therefore be perceived more negatively than in lower-pressure tourism settings.

Second, the professionalism of intelligent guided tours and explanations (A4) and the personalized recommendation system (B4) were placed in the 'Possible Overkill' quadrant. This does not mean that these services are unnecessary; rather, visitors were satisfied with them but did not rate them as highly important as basic functions such as payment, ticketing, parking, or flow control. The result suggests a need to balance technological intervention with the social and exploratory character of theme park experiences (Garrety & Badham, 2000; Ivanov & Velkova, 2025).

Third, the results indicate that intelligent payment systems and parking convenience (A7 and D4) are perceived as current strengths. These services reduce transaction friction and support the continuity of the visit. By contrast, visitor-flow diversion (D2) was classified as a priority for improvement. This indicates that deploying technical systems is not sufficient if real-time guidance, queue information, and on-site communication do not translate into visible improvements in visitors' movement experience.

Conclusion

This study evaluated tourists' perceived importance and satisfaction with smart tourism services at Ningbo Fangte Oriental Dawn through the IPA framework. The findings show that contactless payment, electronic map updates, ticketing convenience, publicity content, and intelligent parking are perceived strengths. Mobile tourism service smoothness, visitor-flow diversion, and online ticket discounts require more focused managerial attention. Some technologically advanced services, such as intelligent guided tours and personalized recommendations, achieved relatively high satisfaction but lower

perceived importance, suggesting that they should be optimized without displacing investment in basic service convenience.

This research makes a valuable theoretical contribution by extending IPA-based smart tourism evaluation to the Chinese theme park context. In doing so, it responds to calls for more context-specific, visitor-centered studies in the smart tourism literature (Mehraliyev et al., 2020). While prior international research has conceptualized smart tourism through smart destinations, ecosystems, and experiences (Gretzel et al., 2015a) or emphasized real-time personalization and interoperability (Buhalis & Amaranggana, 2015), few studies have examined how visitors rank the importance and satisfaction of multiple smart service components within a single high-density theme park. The findings show that basic, efficiency-oriented smart services (e.g., contactless payment, parking, ticketing) carry greater managerial urgency than some immersive or personalized functions (e.g., intelligent guided tours, VR/AR experiences). This pattern suggests that in theme park settings, "smartness" may be primarily valued for friction reduction rather than technological sophistication—a nuance that existing smart tourism models have not explicitly addressed.

This research offers several practical implications. For priority-improvement items such as A6 and D2, the park should enhance mobile interface stability, simplify ticketing and route functions, strengthen real-time queue information, and integrate visitor-flow alerts across electronic maps, mini-programs, and on-site screens. For strength items such as A7 and A11, the park should maintain payment reliability and timely map updates while monitoring whether these services remain convenient during peak periods. For possible-overkill items such as A4 and B4, managers should adopt a lighter intervention strategy, providing contextual prompts only when they support visitors' route choices or attraction understanding rather than interrupting independent exploration.

This study has several limitations. First, the sample was collected through convenience sampling during a specific winter holiday and post-Spring Festival period, and residents and repeat visitors were strongly represented. Future research should use probability-based or stratified sampling across different seasons. Second, the study relied on cross-sectional self-reported data, so it cannot capture changes in satisfaction over time or establish causal relationships. Third, the findings are based on a single case, and their generalizability should be tested in different types of theme parks. Fourth, four indicators related to waste management (C3), cybersecurity (C4), electric vehicle charging (D1), and public transport integration (D3) were identified from the literature as conceptually relevant to smart tourism. However, due to concerns about questionnaire length and respondent burden, these items were not included in the final survey instrument. Consequently, their perceived importance and satisfaction could not be empirically evaluated in this study. Future research should incorporate these indicators with refined wording and examine their role in theme park smart tourism services.

To address these limitations, future research should pursue three focused directions. First, to move beyond perception-based prioritization, IPA should be combined with structural equation modelling, experiments, or longitudinal data to test causal mechanisms linking smart services to satisfaction. Second, two specific findings invite deeper investigation: (a) the "Concentrate Here" placement of mobile tourism services (A6) suggests that future studies could examine whether over-reliance on smart interfaces generates negative effects such as visitor frustration or disengagement, as proposed by Tribe and Mkono's (2017) concept of "e-lineation"; (b) the "Possible Overkill" placement of intelligent guided tours (A4) and personalized recommendations (B4) indicates that visitors may prefer "light-touch" smart interventions over immersive but intrusive ones—a hypothesis that comparative or experimental designs could test. Third, because our results are drawn from a single park, cross-park comparative research is needed to capture how different smart service portfolios affect satisfaction, thereby answering the call for more supplier-perspective studies (Gretzel et al., 2015b).

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Compliance with ethical standards: The authors declare that this study followed basic ethical guidelines for anonymous questionnaire research. Participants were informed about the academic purpose of the survey, voluntary participation, anonymity, and their right to stop answering at any time. No sensitive personal information was collected. For respondents under 18, questionnaires were completed only with the presence and consent of a parent or guardian.

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